

PART VI. WETLANDS ASSESSMENT

BACKGROUND

Wetlands are among Maine's most diverse and valuable natural resources, comprising fully 25 percent of the State's surface area. There are over 5 million acres of freshwater wetlands in Maine, including forested and shrub swamps, bogs, freshwater meadows, marshes and floodplains. Tidal wetlands, such as flats, salt and brackish marshes, aquatic beds, bars and reefs make up about 157,500 acres. Wetlands perform numerous functions which are essential to both human society and the ecological balance of the natural world. Wetlands serve as natural water storage areas which help to lessen flood impacts by absorbing flowing water and reducing its velocity. They also play a vital role in maintaining lake, river and stream levels, and serve as hydrologic links between surface water and ground water aquifers. By trapping sediments and associated pollutants, wetlands often help to protect water quality, and also stabilize shoreline areas which would otherwise be vulnerable to erosion from wave action and currents. Wetlands support a vast array of fish and wildlife, including many endangered and commercially important species. In addition, the aesthetic values of wetlands are enjoyed by Maine residents and visitors through recreational activities such as sport fishing, hunting, canoeing, hiking and wildlife viewing.

Federal Regulatory Framework

Wetlands are regulated by the U.S. Army Corps of Engineers (ACE) and EPA under Section 404 of the Clean Water Act, which established a permit program for discharge of dredged or fill material into waters of the United States, including wetlands. Federal regulations state that a Section 404 permit cannot be issued unless the proposed project complies with guidelines set forth in Section 404(b)(1), Guidelines for Specification of Disposal Sites for Dredged or Fill Material. These guidelines require avoidance of adverse impacts to wetlands by selecting the least environmentally damaging practicable project alternative. Applicants must also take "appropriate and practicable steps" to minimize environmental damage. Once the avoidance and minimization steps have been completed, compensation may be required for any remaining unavoidable wetland loss. Examples of compensation include restoration of previously degraded wetlands, creation of new wetlands on upland sites, enhancement of existing functions or values, and preservation of significant or threatened wetlands.

In addition, Section 401 of the Clean Water Act requires applicants to obtain a certification or waiver from the appropriate State water pollution control agency for Federally permitted or licensed activities that may result in a discharge to waters of the United States, including wetlands. The State agency may review the proposed project with respect to State water quality standards, and may grant or deny certification. States may also place conditions on water quality certifications, or may waive their certification authority. For activities within a State's coastal zone, Section 307(c) of the Coastal Zone Management Act requires applicants to obtain a certification or waiver that the activity complies with the State's coastal zone management program.

State of Maine Wetlands Regulatory Program in the Organized Townships

The State of Maine regulates activities in wetlands under the Natural Resources Protection Act (NRPA). Effective September 29, 1995, changes in the NRPA (P.L. 1995, Chapter 460) made it more consistent with the Federal Section 404 wetlands regulatory program. Maine's Wetland Protection Rules (Chapter 310 of the NRPA) were also amended accordingly effective July 4, 1996. Concurrent with the revisions to the NRPA, ACE instituted a Programmatic General Permit (PGP) with review thresholds comparable to those of the State's program. To streamline the wetland regulatory process, Maine DEP and ACE have adopted a joint permit application form. A single application may now be submitted to DEP to obtain both State and Federal permits, including Section 401 Water Quality Certification. While ACE issues a separate permit, DEP staff coordinate with the federal agencies on reviewing applications, and ACE has agreed to meet the State's mandated processing times for most projects. Section 401 certification is issued simultaneously with permits approved under the NRPA by DEP.

The Department uses a 3 tiered review process to assess applications for wetlands alterations which is based on the size of the proposed wetland alteration:

Tier I. For projects affecting up to 15,000 square feet of wetland, where the wetland is not considered to be of special significance (defined under 38 MRSA Section 480-X(4)). Maximum review time is 30 days. Information required is relatively simple, and professional assistance is generally not needed to complete the application.

Tier II. For projects affecting between 15,000 square feet and 1 acre of wetland, where the wetland is not of special significance. Maximum review time is 60 days. If the proposed alteration is greater than 20,000 square feet, additional application requirements pertain, including a functional assessment and possible compensation.

Tier III. For projects affecting wetlands of special significance, or those affecting greater than 1 acre of wetland. A full review occurs, with a maximum review time of 120 days. Tier III projects are generally the most complex due to analysis of project alternatives and compensation requirements to mitigate for lost wetland functions.

Summary comments on cy 2001 – 2002 licensing efforts:

-No cranberry or agricultural pond general permits were issued. The bottom fell out of the cranberry market and federal agencies have not authorized agricultural ponds without individual permits which renders the state's general permit ineffective.

-In 1997, the 118th Legislature directed the Department to study the feasibility of instituting a Compensation Fee Program to be developed in consultation with the State Planning Office and other state and federal agencies. After several years of analysis of the impact/mitigation data resulting from the wetlands regulatory program, it has been determined that it is not feasible to develop such a program given the relatively low amount of mitigation required under either the state or federal program and the wide geographic distribution of impacts resulting from projects.

-There have been no large scale projects in the last 2 years with attendant large scale mitigation (i.e. Bath Iron Works level loading facility)

-The majority of mitigation achieved is due to state impact thresholds, not federal requirements. The state may seek compensation for *any* level of impact when certain types of wetlands are involved, for example coastal wetlands and peatlands. However, in most cases, the Department cannot seek compensation for projects affecting less than 20,000 square feet. The majority of the several hundred permits issued per year are for projects involving less than 20,000 square feet.

Wetlands Regulatory Program in Maine's Unorganized Territories

The Maine Land Use Regulation Commission (LURC) uses a land use planning approach to regulate activities within wetlands in unorganized portions of the State. Wetland alterations are often handled within the context of a building, development, shoreland alterations, or other type of permit. All areas within the jurisdiction are zoned as management, development or protection subdistricts. The Wetlands Protection Subdistrict (P-WL) is used to regulate activities within wetlands. There are three different types of P-WL:

1. P-WL1 includes open water such as great ponds and rivers as well as other Wetlands of Special Significance;
2. P-WL2 includes scrub shrub and other non-forested freshwater wetlands, excluding those covered under P-WL1; and
3. P-WL3 includes forested freshwater wetlands, excluding those covered under P-WL1 and P-WL2.

LURC's regulatory system is based on mapped wetlands. Mapping, which is in the process of being completed, is based on National Wetlands Inventory maps and includes all wetlands greater than 15,000 square feet. In general, all mapped wetlands are regulated, and unmapped wetlands are not regulated unless a wetland delineation is required. The exceptions to this are (1) streams draining 50 square miles or less (some are mapped, some are not, but all are regulated), and (2) projects disturbing more than one acre of land (either wetland or upland) require all wetlands in the project area to be delineated, with all identified wetlands becoming jurisdictional. There is also a 4,300 square foot exemption for impacts to a P-WL2 or P-WL3.

Permitting is based on a three-tiered system similar to the Maine Department of Environmental Protection under the Natural Resources Protection Act. LURC's rules incorporate standards for avoidance, minimal alteration, water quality, erosion control, compensation, and no unreasonable impact. The thresholds for the level of tier review are tied to the size of the wetland impact and the type of wetland.

Tier 1: Used for projects impacting from 4,300 sq. ft. to 15,000 sq. ft. P-WL2 or P-WL3 wetlands. Applies standards for avoidance, minimal alteration, water quality, erosion control. No wetland delineation, functional assessment, or compensation required.

Tier 2: Used for projects impacting 15,000 sq. ft. to 43,560 sq. ft. P-WL2 or P-WL3 wetlands that do not contain critically imperiled or imperiled natural communities. Applies standards for avoidance, minimal alteration, water quality, erosion control, and compensation. Requires alternatives analysis and wetland delineation, and may require functional assessment and compensation.

Tier 3: Used for projects impacting any area of P-WL1 wetland, 15,000 sq. ft. to 43,560 sq. ft. of P-WL2 or P-WL3 wetlands containing critically imperiled natural communities, or 43,560 sq. ft. or more of P-WL2 or P-WL3 wetlands. Applies standards for avoidance, minimal alteration, water quality, erosion control, compensation, and no unreasonable impact. Requires alternatives analysis, and usually functional assessment for alterations that are greater than 500 square feet. May require wetland delineation and compensation.

As of September 1999, LURC has sole jurisdiction over wetlands in unorganized areas and does not co-review wetland impacts with the Department of Environmental Protection. LURC has developed a method of reducing the level of tier review for a selected group of minor wetlands-related activities in a way that is similar to DEP's permit-by-rule.

Although wetland impacts have not been tracked in the past, LURC is considering modifications to its database and is also discussing tracking options with the State Planning Office. Wetland impacts due to land management road construction submitted with forest operations notifications are being tracked in a separate database at LURC.

DEVELOPMENT OF WETLAND WATER QUALITY STANDARDS

Maine has made great strides in recent years to develop an efficient State wetland regulatory program, administered through the Natural Resources Protection Act, Wetland Protection Rules and Land Use Regulatory Commission regulations. The current program focuses largely on physical wetland alterations, but is not well coordinated with State and federal water quality protection programs which more broadly address the health of aquatic resources. Numerous human activities which may not result in wetland loss, but which nevertheless degrade wetland quality, are not currently regulated in Maine. The implementation of State water quality standards for wetlands is a crucial remaining gap which needs to be addressed to adequately protect the ecological integrity of Maine wetlands.

Under the federal Clean Water Act, States are required to develop programs to evaluate the physical, chemical, and biological integrity of the Nation's waters, including wetlands, and to adopt water quality standards to restore and maintain that integrity. States must also report on the condition of all waters every two years, including attainment status in relation to water quality standards. The steps involved in applying water quality standards to wetlands include:

1. Inclusion of wetlands in the definition of "State waters";
2. Designating uses which address State management concerns and the goals of the Clean Water Act;
3. Adopting criteria sufficient to protect designated uses; and
4. Application of the State antidegradation policy to wetlands.

As required by EPA for other water bodies, designated uses for wetlands must, at a minimum, provide for the protection of fish, shellfish, wildlife, and recreation. Effective in 1987, States are required to adopt numeric criteria for toxic pollutants for which EPA has published criteria. Where numeric criteria are not available, States may adopt criteria based on biological monitoring and assessment methods. States must also adopt nutrient criteria for all waters, including wetlands, by 2004. Maine's water quality standards framework and related policies will need to be clarified with respect to wetlands in order to comply with these requirements.

Current Status of Wetland Water Quality Standards in Maine

Wetlands are implicitly included in Maine's definition of "Waters of the State" under the Protection and Improvement of Waters Act, 38 M.R.S.A. Section 361-A(7) as follows:

"...any and all surface and subsurface waters that are contained within, flow through, or under or border upon this State or any portion of the State, including the marginal and high seas, except such waters as are confined and retained completely upon the property of one person and do not drain into or connect with any other waters of the State, but not excluding waters susceptible to use in interstate or foreign commerce, or whose use, degradation or destruction would affect interstate or foreign commerce."

Although wetlands may be considered waters of the State under the above definition, Maine does not have wetland-specific designated uses or criteria. Development of biological criteria and

other water quality standards for wetlands is a priority in DEP's Performance Partnership Agreement with EPA and is also included in the Maine Wetland Conservation Plan. A primary goal of the Maine DEP Biological Monitoring Program is to develop wetland-specific biological criteria and incorporate them into State water quality standards. The expected time frame needed to complete this effort is not sufficient to address immediate program needs and federal requirements, however.

Where appropriate, existing water quality standards for fresh surface waters and estuarine and marine waters (described in Maine's Water Classification Law) may be applied to wetlands as an interim measure. Existing standards, including designated uses, criteria, and Maine's antidegradation policy, are largely applicable to wetlands, provided appropriate assessment methods are used to determine wetland attainment status. Current narrative biological criteria are expected to be especially useful for wetlands. In addition, the Maine Water Classification Law provides for flexibility where specific uses or criteria may not be suitable.

DEP already applies existing water quality standards for certain activities related to wetlands, particularly in wetlands contained within or directly adjacent to other surface waters. Most other states which currently implement water quality standards for wetlands have also used a similar initial approach. Although this policy has precedent within Maine DEP, it is not uniformly applied across all program areas, and needs clarification to ensure adequate protection of State wetland resources, regulatory consistency, and compliance with the Clean Water Act.

Development of Nutrient Criteria

In response to EPA's 2004 deadline to implement nutrient criteria for all waters, Maine DEP has submitted a Nutrient Criteria Adoption Plan, including a plan for wetlands. Due to the range of natural conditions inherent to wetlands, including wide spatial and temporal variability in nutrient concentrations, Maine plans to develop nutrient criteria based on biological response indicators. Approaches being considered include the use of algal and vegetative indicators of wetland nutrient enrichment (community composition, productivity, etc). DEP will also investigate the use of chemical nutrient concentration thresholds as appropriate for specific wetland classes. Biological impairment thresholds developed for nutrients will be tied to existing use classes, if it is determined that these classes are applicable to wetlands on an interim basis. Otherwise, new classes will need to be defined and adopted into law before nutrient criteria may be implemented. As stated above, the long term goal for Maine is to develop wetland-specific uses and criteria.

In order to implement the Nutrient Criteria Adoption Plan for wetlands by 2004, Maine DEP will need additional staff and funding. The Plan will involve conducting vegetative and algal assessments for freshwater wetlands which are not currently performed, and additional assessment data for coastal wetlands. Since DEP currently does not have sufficient resources to fund and staff this initiative, development of nutrient criteria for wetlands is currently unscheduled.

The Need for Wetland Water Quality Standards

Regulatory Consistency

Because various environmental laws which govern activities in and around wetlands reference State water quality standards, discrepancies in interpreting or applying the Water Classification Law with respect to wetlands may affect regulatory consistency. Examples of wetland-related programs which are linked to standards and criteria in the Water Classification Law include: permitting under the Natural Resources Protection Act, Site Location of Development Law, and Maine Stormwater Management Law, wetland regulations administered by the Land Use Regulatory Commission (LURC) in the unorganized territories, the Shoreland Zoning program, State water discharge licensing, Section 401 water quality certification (including hydropower licensing), the National Pollutant Discharge Elimination System (NPDES) program, and risk assessments and remediation projects related to oil and hazardous materials laws.

Environmental Concerns

Unclear or inconsistent policies regarding wetland water quality standards and their relationship to other State environmental laws pose a serious threat to the integrity of Maine wetlands. Aside from direct physical loss of wetlands (by filling, etc.), wetlands may be damaged by point and nonpoint source pollution, changing water levels, soil erosion, stormwater runoff, and agricultural and forestry activities. Impacts to wetlands may include nutrient enrichment and eutrophication, changes in natural wetland chemistry, excess sedimentation, habitat loss, accumulation of toxic substances, and detrimental changes in wetland community structure. Ultimately, these impacts may result in loss of desirable or sensitive plant and animal species, over-abundance of pollution-tolerant organisms, and the spread of invasive species. It is therefore essential that water quality standards are applied to all waters to compliment existing wetland protection efforts and ensure that wetlands are fully integrated into State water quality protection programs.

Ecological degradation of wetlands also impacts the quality of associated water bodies through both physical and biological links. Since wetlands often occur within or adjacent to lakes, rivers, streams and coastal waters, it is not always possible to distinguish clear boundaries between different types of surface waters. Often it may be more appropriate to view wetlands as part of a continuum between deep water habitats and uplands. Wetlands perform important hydrologic and geochemical functions which benefit adjacent aquatic systems, including ground water recharge, maintenance of stream flow, sediment and toxicant retention and nutrient cycling.

Wetlands also play a vital role in food chain support, and provide essential breeding, foraging and resting habitat for aquatic life and wildlife. Many organisms which inhabit other water bodies depend on wetlands on a seasonal basis, or during certain life stages. Wetlands need not be physically connected with other surface waters in order to provide these biological functions. Since the relationships among wetlands and other waters are complex, it is important to consider water quality issues in a watershed context, rather than isolated by water body type.

Economic Concerns

The loss of wetland health from human activities has potential negative consequences to Maine's economy. A large number of businesses rely directly or indirectly upon tourism and recreational activities involving wetlands, such as sport fishing, hunting, canoeing, hiking and wildlife observation. Commercial fisheries and shellfish production in Maine also depend on wetlands to provide nursery areas and food sources for many valuable species. These industries are vulnerable to water quality impairment which may degrade wetland biological communities.

In addition, wetlands are important in storing flood waters, mitigating peak flows, and absorbing wave energy to reduce shoreline erosion. A decline in these wetland functions due to changes in hydrology (i.e. increasing the depth, frequency or duration of flooding) increases the likelihood of property damage and risks to human life. Experience has shown that wetland restoration is expensive, and it is often difficult or impossible to effectively duplicate natural wetland systems. The consistent application of State water quality programs to enhance wetland protection and pollution prevention represents a far more cost-effective option.

INTEGRITY OF WETLAND RESOURCES

Guidelines for the Functional Assessment of Maine's Coastal Wetlands

The State of Maine has strong coastal management laws under the Wetland Protection Rules, Natural Resources Protection Act, and Water Classification Program that are designed to reduce impacts caused by commercial and private development in marine environments. However, there is no standard assessment methodology to assess the potential effects of permitted activities on coastal intertidal and sub-tidal habitats. After reviewing all the comments and scientific data, approval or denial of an application is based on the permit reviewers "best professional judgment" to evaluate threats to marine environments. This decision is often based on inadequate and inconsistent biological assessments that provide little insight into the functions and values of the habitat that may be lost upon development and/or modifications.

In October 1997, a NOAA Coastal Management Fellow was hired by Maine DEP to develop a coastal wetland assessment methodology for Maine. The two year project was a collaborative effort between Maine DEP, Maine and New Hampshire Sea Grant, Maine State Planning Office and Maine Department of Marine Resources.

The primary objectives of the project were to improve the permitting process through education, development, and use of functional assessment guidelines. The guidelines provide information on the ecological functions; commercial, recreational, social and educational values; species composition; physical, chemical and geological characteristics; seasonal fluctuations; and aesthetics. Sampling protocols for each type of marine habitat are included. In addition, a natural history guide was developed for licensing staff that includes the distribution and quantity of Maine coastal habitats, the potential functions and values of each undeveloped environment and management guidelines.

A draft assessment protocol was written and distributed to licensing staff and Maine marine environmental consultants. Comments from consultants were gathered, reviewed and incorporated into a second draft. In December 1998, a second draft was distributed to two consultants for review and testing. In the fall of 1999, the final functional assessment report was completed along with educational material on the value and sensitivity of Maine marine intertidal and sub-tidal habitats.

Biological Assessment of Freshwater Wetlands

The Need for Wetland Bioassessment

Wetlands are an integral component of Maine watersheds, and comprise roughly 25% of the State's area. Compared with other aquatic resources however, there is relatively little information available on wetland condition in Maine. Since colonial times, over half of the wetland acreage in the lower 48 states has been lost due to development, agriculture and forestry activities, including about 20% of Maine's wetlands. Moreover, the ecological integrity of our remaining wetlands is threatened by habitat fragmentation, toxic chemicals, polluted runoff, hydrologic modifications and invasive species, especially in rapidly urbanizing areas. Past efforts to track and report wetland impacts have largely focused on wetland quantity, for example, the number of acres filled compared to acres restored. Until recently, little attention has been devoted to assessing the health of Maine wetlands, despite federal requirements described in the Clean Water Act.

With ever-increasing pressure on Maine wetlands from development and other human activities, there is a compelling need for improved scientific information about the current condition of wetlands in the State, sources and causes of impairment, and long-term trends in wetland health. To make sound decisions in wetland management, planning, and regulation, it is essential to understand the relative risks to wetlands from various human activities. It is also important to develop tools for wetland assessment and management on a watershed basis, and ensure that complex ecological linkages with other water bodies are taken into account.

Most wetland evaluations conducted in Maine for regulatory or planning purposes currently use an assessment approach based on wetland functions and values, typically the U.S. Army Corps of Engineers Highway Methodology¹. The Highway Methodology is a qualitative, descriptive approach used to characterize wetland functions and values for the wetland permitting process. The Highway Methodology is a useful rapid-assessment tool for wetland planning and management, especially for screening-level wetland characterizations or to predict expected changes in wetland functions and values from proposed activities.

Function and value assessments of this type generally focus on the physical structure of wetlands and their utility to humans, but do not directly measure ecological health or impacts to water quality, aquatic life and wildlife. For example, a wetland may appear to contain good habitat for

¹ USACOE. 1995. The Highway Methodology Workbook Supplement: Wetland Functions and Values, A Descriptive Approach. U.S. Army Corps of Engineers New England Division. 32 pp. NEDEP-360-1-30a.

fish and wildlife, but actual populations may be impaired by chemical contamination which would not likely be detected by a function and value assessment. Similarly, a wetland which has high value for flood control may be in poor shape from an ecological standpoint due to man-made alterations (ditches, dikes or dams), polluted runoff, excess sediment, and the presence of invasive species. Moreover, since function and value assessments like the Highway Methodology are descriptive in nature and designed to incorporate human values (such as scenic/aesthetic beauty and educational value), results are often subjective and may vary significantly depending on the evaluator and purpose of the assessment.

For many applications, assessment methods that employ a standardized scientific approach designed to evaluate wetland condition are needed. Traditional chemical measures of water quality are useful to help determine sources of wetland contamination, but do not provide information about acute or long-term impacts on aquatic life and wildlife. Chemical water samples serve as a “snapshot in time”, since chemical concentrations measured may be highly variable from day to day depending on such factors as the timing of discharges, amount of recent precipitation and water flow patterns. Water samples alone may therefore be misleading, and may fail to detect intermittent contaminants that can damage wetland ecosystems. Moreover, chemical sampling is not useful to evaluate certain types of wetland impacts, such as the presence of invasive species.

Information about resident wetland plant and animal communities is especially beneficial as an indication of both water quality and overall wetland health. Unlike physical and chemical measures, biological communities integrate the effects of environmental stressors over time, since the numbers and types of organisms present reflect the quality of their surroundings. Biological assessment provides a direct, objective measure of wetland condition and can be used to evaluate impacts from a variety of human activities. The following are potential applications of wetland bioassessment:

- Detecting ecological impairment for screening-level inventories, site-specific impact assessments and long-term trend analysis;

- Diagnosing physical, chemical and biological stressors, including toxics, nutrient enrichment, non-point source pollution, hydrologic changes, and introduced species;

- Evaluating the effectiveness of wetland protection activities;

- Developing performance standards for restoration projects;

- Identifying ecological linkages among wetlands and other water bodies to refine water quality modeling;

- Developing and supporting wetland standards and criteria, including biological and nutrient criteria, and

- Tracking wetland condition over time, including information for the Maine Water Quality Assessment Report to Congress required under Section 305(b) of the Clean Water Act.

DEP Wetland Biological Monitoring Program: Status and Implementation Plan

In 1998, Maine DEP began development of a biological monitoring and assessment program for freshwater wetlands. DEP conducted a 3 year pilot study in the Casco Bay watershed to develop monitoring protocols, examine differences in wetland community structure along a gradient of human disturbance, and identify candidate metrics (indicators) to assess wetland biological integrity. The project focused on aquatic macroinvertebrates and algae, including collection of associated physical, chemical and habitat data. During 2001 and 2002, DEP expanded monitoring to the Saco, Piscataqua and Kennebec River watersheds using the methods developed in the pilot study. As of 2002, DEP has conducted wetland biomonitoring at 88 different sites encompassing 115 sampling events. Some sites have been sampled repeatedly over multiple years.

As part of the effort to develop a wetland biomonitoring program, Maine DEP staff actively participated on EPA's Biological Assessment of Wetlands Work Group (BAWWG). BAWWG was formed in 1997 to improve methods and programs to assess the biological integrity of wetlands. The group included wetland scientists from Federal and State agencies and universities. A major accomplishment of the BAWWG was development of a series of state-of-the-science modules related to wetland biological assessment. These modules, collectively titled "Methods for Evaluating Wetland Condition", were published by EPA in 2002. Copies of the modules and additional information about wetland bioassessment may be found on the BAWWG web site at <http://www.epa.gov/owow/wetlands/bawwg>. The modules may also be downloaded from the following U.S. EPA web site: <http://www.epa.gov/ost/standards>.

EPA Region I formed a regional work group as a counterpart to BAWWG in 1998. The New England Biological Assessment of Wetlands Work Group (NEBAWWG) currently coordinates a regional wetland biomonitoring network and sponsors state biomonitoring pilot projects. NEBAWWG also hosts conferences and training workshops related to wetland bioassessment in New England. DEP staff maintain an active role in this group. More information about NEBAWWG may be found at <http://www.epa.gov/region01/eco/wetland/>.

The functions of BAWWG were merged into EPA's National Wetland Monitoring and Assessment Work Group in 2002. This new group was formed to help states implement wetland monitoring and assessment programs through policy and guidance development and technical support. A major goal of the work group is to ensure that wetlands are integrated into state and tribal monitoring strategies along with other waters. A technical subcommittee supports the scientific objectives of the work group, and is continuing work formerly performed by the BAWWG. A Maine DEP biologist currently serves on the national work group and technical subcommittee.

Program Purpose and Goals

The purpose of DEP's wetland biological monitoring program is to provide the State with scientific and technical information related to wetland water quality and ecological integrity, especially biological aspects. Major program functions include conducting wetland biological monitoring and assessment, investigating causes and sources of wetland impairment, developing

wetland standards and criteria, and providing technical support to other State programs involved in wetland regulation, planning and management. Biomonitoring program staff also represent DEP at pertinent state and federal meetings, serve on technical and policy work groups related to wetlands, and are involved in a variety of wetland education and outreach activities.

These activities support the following overall program goals:

- To evaluate the ecological integrity of wetlands in the State and identify significant trends in wetland condition
- To enhance the State's ability to predict and assess risks to wetlands from human activities
- To improve management and regulatory strategies to protect and restore wetland ecological integrity
- To heighten public awareness about the ecological importance of wetlands, threats to wetland health and protection measures

Implementation Strategy and Monitoring Design

The Maine wetland biomonitoring initiative has been incorporated into DEP's existing Biological Monitoring and Criteria Program. This has been an efficient way to pool limited resources in areas such as equipment purchases, seasonal field staff and contract management. This strategy has also allowed DEP to build on the experience of Maine's nationally recognized river and stream biomonitoring program, which was established in 1983. As of 2002, annual wetland monitoring is coordinated with the State's river and stream biomonitoring program using the 5-year rotating basin schedule shown below. Figure 3-6.1 depicts the areas of the state included in each of these major regions, along with 88 wetland stations for which monitoring data has previously been collected.

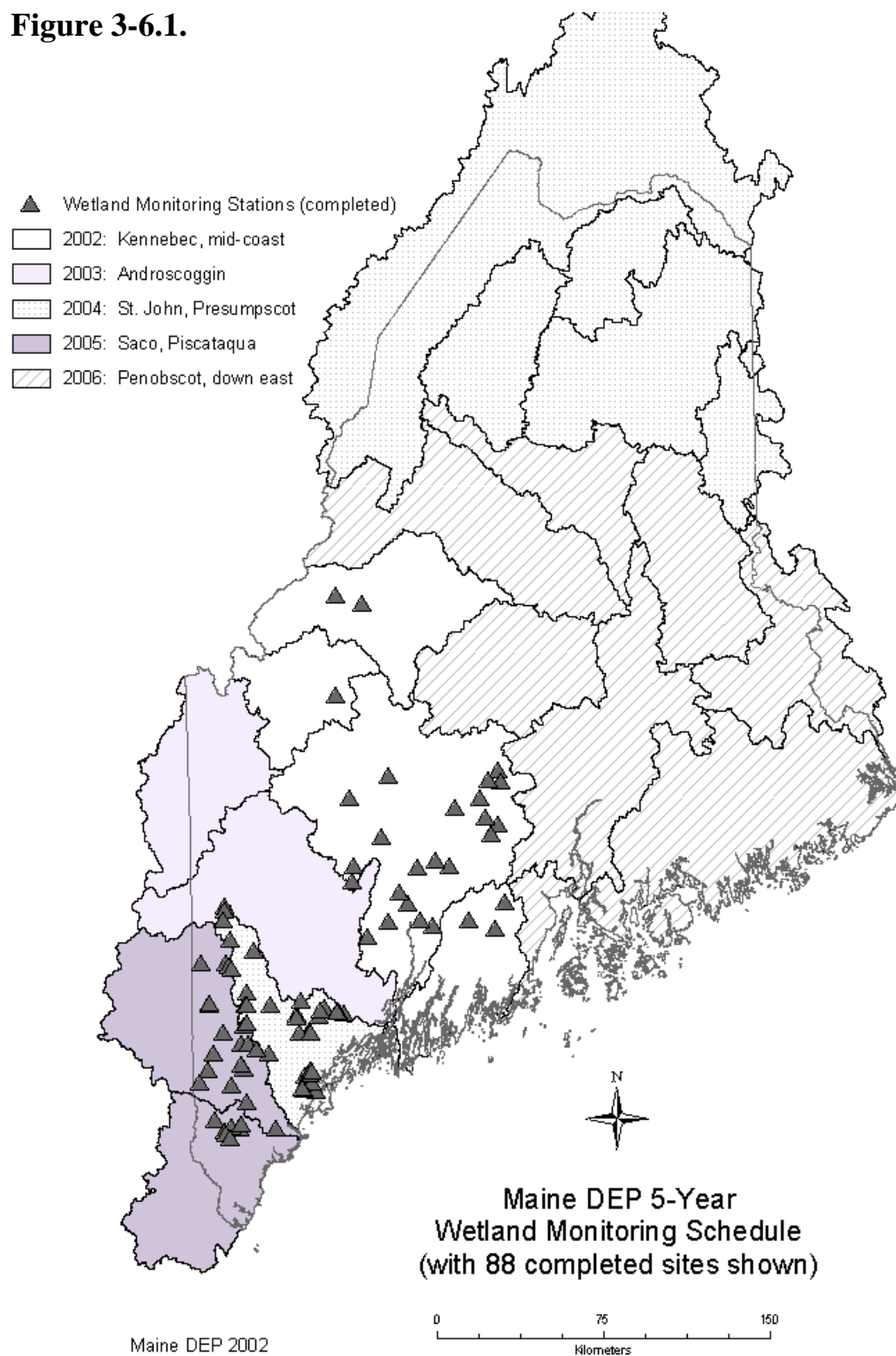
DEP Five Year Biomonitoring Schedule

Androscoggin watershed	2003
St. John, Presumpscot watersheds	2004
Saco, southern coastal watersheds	2005
Penobscot, downeast watersheds	2006
Kennebec, mid-coast watersheds	2007

All wetlands currently sampled are semi-permanently or permanently inundated (i.e. sites having standing water most of the time except during unusually dry periods). These include palustrine, riverine fringe and lacustrine wetlands. Wetlands are targeted on a watershed basis to encompass a range of human disturbance, from known poor-quality sites to potential reference (minimally-disturbed) wetlands. This approach was selected to facilitate testing and refinement of biological metrics throughout the state. Additional sites may be targeted to address specific regulatory or management concerns.

Other considerations for site selection include hydrologic regime, geographic distribution of sites, landscape position, management significance, and accessibility. The selection process involves a review of existing spatial data using a Geographic Information System (GIS), including National Wetland Inventory maps, topographic maps, air photos, and State hydrography and road layers. Field reconnaissance is performed prior to monitoring to verify wetland types, locations, and access.

Figure 3-6.1.



Indicators and Overview of Methods

Aquatic Macroinvertebrates

Maine DEP currently assesses aquatic macroinvertebrates as the primary taxonomic group for the wetland biomonitoring program. Macroinvertebrates are found in virtually all wetlands, and are an essential component of wetland food webs. They consume algae, detritus, plants and smaller prey organisms, and provide an important food source for fish, waterfowl and other wildlife. Macroinvertebrates also play an integral role in nutrient cycling and energy transfer, both within wetland ecosystems and between wetlands and other habitats.

Since macroinvertebrates are a highly diverse group of organisms having a wide range of tolerance to human-induced stressors, they are extremely useful as indicators of environmental condition. Aquatic invertebrates are generally limited in mobility, and have relatively long and complex life cycles of up to several years. Macroinvertebrate communities therefore integrate and reflect environmental changes over time which may not be detected by other types of assessment.

Wetland macroinvertebrates are currently sampled during June and early July. Three different sampling methods to collect macroinvertebrates have been tested to develop tools for various applications and sampling intensity:

Multi-Habitat Sampling – A qualitative, multihabitat sampling approach was developed as a screening level assessment tool. A standard D-frame net is used to sample all inundated microhabitats at each site, including emergent vegetation, aquatic macrophyte beds, pools and channels. Samples are “picked” or sorted from detritus in the field. One to several organisms representing each different taxon found are placed into a vial of alcohol until no different taxa are observed.

Stovepipe Sampler – A five-gallon bucket with the bottom removed is used to enclose 3 replicate plots to restrict the movement of organisms. Samples are collected in areas of emergent vegetation. The stovepipe sampler is pressed into the wetland substrate, and the contents of the sampler are then agitated. Vegetation and surface sediment are placed into a sieve bucket. The sampler is then swept 10 times with a small hand net. Large pieces of vegetation are washed and discarded, however finer plant material and detritus are retained. Samples are preserved for later sorting and taxonomic analysis in the laboratory.

Dip Net Measured Sweep – A standard D-frame net is used to obtain a semi-quantitative sample. Samples are collected in areas of emergent vegetation. A sample is collected by submersing the net and sweeping through the water column for a distance of one meter. The net is bumped against the bottom substrate 3 times (at the beginning, middle and end of the sweep) to dislodge and collect organisms from the sediment. All material collected is placed in a sieve bucket. Large pieces of vegetation are washed and discarded, however finer plant material and detritus are retained. Three replicate samples are collected in areas of emergent vegetation. Samples are preserved for later sorting and taxonomic analysis in the laboratory.

Algae and Diatoms

Algae are an important component of wetland ecosystems. They serve as a food source for invertebrates and small fish, and also play an essential role in nutrient and energy cycling. Algae strongly influence oxygen levels in the water column through photosynthesis and respiration, and often account for a significant portion of wetland metabolism.

Algae and diatoms have been widely used as indicators of water quality and biological integrity in aquatic ecosystems. They are highly sensitive to a range of environmental stressors including nutrient enrichment, changes in pH, pesticides and many other contaminants. Since algae have rapid growth rates and respond quickly to perturbations, they often provide an early warning of changing environmental conditions which may not be detected by other methods. Diatoms are particularly useful in assessing wetlands during dry periods and to determine historic environmental conditions, as their cell walls consist of a glass-like material which persists in wetland sediments over long periods of time.

DEP began collecting algae and diatom samples in 1998 during the Casco Bay pilot project. This was a collaborative effort with Dr. R. Jan Stevenson of Michigan State University to develop algal indicators of wetland integrity. The algae and diatom project was initially supported through an EPA Headquarters Cooperative Agreement, but has not yet been completed due to lack of continued funding. Although DEP collected wetland algae and diatom samples each summer from 1998 through 2002, only samples from 1998 and 1999 have been processed. Samples from subsequent years have been archived until adequate funding can be obtained for taxonomic identification, statistical analysis and metric development. Based on available data from 1998, algae show great promise for use as indicators of wetland condition in Maine.

Four algae sample types were tested to determine which produce the best indicators of wetland condition. Material from multiple sites within each wetland are combined into a single sample from each of the following habitats:

Water column – Water samples are collected for quantitative analysis of phytoplankton abundance and species composition. Chlorophyll a is also analyzed as an indicator of algal biomass. A long handled dipper is used to collect water samples just below the surface. Water from multiple areas of the wetland are combined into a single sample.

Plant stems - Garden shears are used to clip plant stems below the water line to collect epiphytic algae. The plant stems are placed into a whirlpak bag, and distilled water is added. The stems are then massaged to remove attached algae and diatoms, rinsed with additional distilled water and discarded. As of 2002, the surface area of each plant stem is also calculated from field measurements to obtain a more quantitative sample.

Sediments – Sediments for qualitative algae and diatom samples are collected using a turkey baster and/or plastic spoon. As of 2002, a quantitative sample is obtained using a petrie dish pressed into the substrate and retrieved with a spatula. Three replicates are collected and combined into a single sample.

Multihabitat sample – Material from each of the above single-habitat samples is combined into single container to obtain a qualitative multihabitat sample.

Vegetation

Plants are a conspicuous feature of wetland ecosystems, and form the foundation for wetland structure and function. Vegetation comprises the base of wetland food chains, and provides essential habitat for all types of wetland life. In some wetlands, primary productivity (the amount of biomass produced by plants) is comparable to productivity measured in rain forests. Wetland plant communities play a significant role in carbon cycling, including compounds such as carbon dioxide and methane, and function to moderate climate patterns on a regional and even global scale. Plants influence water quality through uptake of nutrients, metals and other contaminants, as well as by moving nutrients from sediments into the water column. They also stabilize shoreline areas and sediments, and modify currents and water flow patterns.

Plant communities are sensitive indicators of wetland health, and are especially useful for evaluating impacts from nutrients, hydrologic changes, sedimentation, habitat fragmentation and invasive species. Plants may serve as the primary biological assemblage to monitor “drier” wetlands where aquatic invertebrates are not abundant, and can also be used to detect chronic long-term stress to wetland ecosystems.

As funding becomes available, Maine DEP plans to incorporate standardized plant community assessments into its biological monitoring program, and to develop vegetative metrics related to wetland condition. Examples of plant metrics used in other states include species richness, percent cover of dominant species, relative proportions of native and non-native taxa, percentages of tolerant/intolerant taxa, and numbers of annual vs perennial species. DEP also plans to use vegetative indicators of nutrient enrichment to help develop wetland nutrient criteria. Measures of nutrient enrichment include structural indicators such as community composition metrics, and functional indicators such as stem height, biomass production and nutrient content in plant leaves. The proposed vegetative assessment component of DEP’s wetland biomonitoring program is currently unscheduled due to lack of adequate staff and funding.

Water Quality and Site Characterization

Physical and chemical water quality data are obtained through field measurements and analysis of water samples. These may include water temperature and depth, dissolved oxygen, conductivity, pH, nutrients, chlorophyll a, anions and cations, dissolved organic carbon, color, and alkalinity. Habitat descriptions, including Cowardin classification, substrate type and a qualitative listing of dominant plant species are also recorded.

Human activities observed in the field which may impact wetland condition are also noted and scored based on relative severity and type of disturbance. Major disturbance categories include hydrologic and vegetative modifications, evidence of chemical pollutants, impervious surface in the watershed, and other potential non-point sources of pollution.

This information is used to characterize wetlands for appropriate classification, determine relative levels of human disturbance for metric development, identify sources and causes of degradation, and verify that candidate reference wetlands are actually minimally-impaired.

Landscape Level Wetland Assessment

Maine DEP plans to apply landscape level assessment methods to predict risks to wetlands from various human activities on a watershed basis. This work will incorporate elements from existing GIS-based models developed in Maine and other States. Land use and land cover will be characterized to create watershed profiles (for example, percent impervious area, forest, agricultural lands, etc.). Other available watershed data related to wetland health will also be included, such as known discharges, dams, water quality data and population growth information. Potential data sources include:

- Land use and land cover satellite classification;
- DEP Watershed Management Division land use/impervious surface data;
- Maine State Planning Office wetland risk data (including data from the Casco Bay wetlands characterization project);
- DEP river and stream bioassessment data;
- DEP ground water threats database;
- DEP monitoring data required for permits;
- Maine Natural Areas Program endangered and threatened plant data.

Land use profiles and other watershed characterization data will be scored and compiled to produce a landscape disturbance index, including thresholds and criteria to predict wetland risk categories. Wetland risk estimations will be verified, refined and calibrated using biological monitoring data and associated physical and chemical data. DEP will examine the relationships between predicted risks (based on the landscape disturbance index), and on-the-ground measures of wetland health (based on biological metrics). The landscape disturbance index and/or risk categories may then be modified as necessary to improve their capability to predict wetland ecological impairment.

Based on this work, DEP expects to develop strategies and actions for wetland management to protect and improve wetland ecological integrity. Landscape level assessments will be used to identify potential wetland threats, diagnose sources and causes of impairment, and better describe the human disturbance gradient for use in biological assessments. This information may also be used to identify and prioritize potential wetland restoration sites. The landscape disturbance index will be a flexible tool designed for use at various scales, depending on the desired application. The initial phase of the project is planned for the Casco Bay watershed due to the availability of more comprehensive GIS layers and biological monitoring data. Landscape level assessments will be applied to additional portions of the State provided adequate funding and staff resources are available.

Quality Assurance

DEP's wetland monitoring program incorporates established quality assurance/quality control practices of the Biological Monitoring Program and the Division of Environmental Assessment, with modifications as needed where sampling protocols are specific to wetlands. Examples include the use of standard procedures for collecting field data and replicate samples, sample tracking, equipment calibration, and sorting, identification and coding of macroinvertebrate samples. Maine DEP has an EPA approved Quality Management Plan, and is working to develop a comprehensive Quality Assurance Project Plan which will address various components of the Biological Monitoring Program.

Data Management

DEP's biomonitoring program is close to completing development of an ACCESS database including macroinvertebrate, physical, chemical and habitat data. This database will facilitate calculation of complex biological metrics, statistical data analysis and reporting. The wetland biomonitoring database can interface with data stored in ORACLE, including DEP's river and stream biomonitoring data. This is important to avoid duplication of effort, and for quality assurance purposes. Both the wetland and river and stream programs utilize a number of common data tables, such as macroinvertebrate taxa codes, hydrologic unit codes, and other hydrography and political boundary data. The wetland database will have the capacity to interface with statistical analysis and GIS applications, and will be compatible with EPA's STORET database. DEP also maintains a spatial database containing wetland biological monitoring station locations using ArcInfo.

Data Analysis and Assessment

Biological monitoring results are analyzed on an ongoing basis to identify and refine biological metrics used to evaluate wetland condition. Metrics are selected by examining biological monitoring data from a number of wetlands sampled across a gradient of human disturbance. Wetlands are targeted for monitoring to encompass a wide range of ecological condition, from highly impacted sites to minimally disturbed reference wetlands. Wetland attributes that show predictable changes in response to human activities are then tested using data from additional sites to determine which metrics provide the most reliable information about wetland condition.

Analyses performed to date reveal significant relationships between a number of candidate invertebrate metrics and watershed development. Examples of macroinvertebrate metrics include the diversity and relative abundance of dragonflies, mayflies, caddisflies and midges. Many invertebrate metrics tested also respond to changes in water quality typically associated with urban non-point source pollution, including elevated conductivity and concentrations of dissolved ions and nutrients.

DEP is currently working to develop thresholds and criteria for incremental levels of biological impairment based on wetland macroinvertebrates. DEP is also exploring statistical methods to summarize wetland data, including multimetric and multivariate analyses. These are necessary steps to enable the State to use biological monitoring data in wetland regulatory and management decisions, develop wetland-specific water quality standards, and report on wetland condition as

required under the Clean Water Act. To accomplish this, candidate metrics must be tested statewide, since wetland biomonitoring data are limited or absent for many regions. As additional data are collected in areas of the state not previously sampled, DEP will also examine potential regional issues and ecological linkages among wetlands and other waters.

Reporting

DEP has reported on the progress of wetland monitoring and assessment in the State's Water Quality Assessment required under section 305(b) of the Clean Water Act for the past several reporting cycles. DEP eventually plans to report on attainment status for wetlands, but will first need policy clarifications and/or legislative changes to consistently implement water quality standards for wetlands. DEP is currently working with EPA to upload monitoring data for all waters, including wetlands, into the national STORET database.

Program Review

DEP has worked closely with EPA and wetland experts across the U.S. in developing its wetland biological monitoring program. DEP staff have served on relevant national and regional work groups including the Biological Assessment of Wetlands Work Group (BAWWG), the New England Biological Assessment of Wetlands Work Group (NEBAWWG), the National Wetland Monitoring and Assessment Work Group, and the New England Interstate Water Pollution Control Commission (NEIWPCC) wetland work group. DEP's wetland bioassessment work has been peer reviewed through presentations at meetings of these work groups and professional organizations including the Society of Wetland Scientists, the Association of State Wetland Managers, and the New England Association of Environmental Biologists. DEP staff have also presented to staff of various State agencies involved in wetland management in Maine.

Education and Outreach

In addition to presentations at professional meetings and conferences, DEP staff periodically assist with wetland biomonitoring training workshops for other agency staff, wetland professionals and volunteers. DEP biomonitoring program staff have also contributed to the writing and review of several major EPA documents related to wetland monitoring and assessment.

DEP biomonitoring staff respond to wetland information and speaking requests from schools and conservation groups as time allows, and have participated in educational programs such as the Maine Envirothon, an environmental competition for high school students. Program staff are also designing a wetlands web page for the Maine DEP web site. The wetlands web page is scheduled for completion by fall 2002, and may be accessed by visiting the Bureau of Land and Water Quality at <http://www.state.me.us/dep/blwq/>.

Future Program Needs

To successfully implement a comprehensive biological monitoring program for wetlands, Maine DEP needs to build the capacity to assess multiple biological assemblages. This is necessary because various groups of organisms differ in their sensitivity as indicators, depending on the type of wetland and the environmental stressors involved. Although DEP has made good progress in developing assessment methods for aquatic macroinvertebrates, there is a particular need to incorporate vegetative and algal assessments into the biological monitoring program for wetlands. This will greatly improve the State's ability to monitor a variety of wetland types, including less frequently inundated wetlands, and to evaluate impacts from a wide range of human activities. The use of plants and algae to assess ecological condition is also an important step in developing environmental response-based nutrient criteria for Maine wetlands.

Current staff and funding levels are not adequate to fully implement and sustain an effective State wetland biomonitoring program. At present, DEP's wetland bioassessment program is administered and staffed by one permanent full-time biologist, with limited additional support provided by river and stream biomonitoring program biologists and summer field staff. This position has primary responsibility for all aspects of the wetland monitoring program, including grant management, planning and oversight of field work, data management, data analysis, reporting, biological criteria development, outreach, and technical support to other programs. Additional professional staff having advanced knowledge of biological assessment principals, taxonomy, wetland science, data analysis and environmental policy are urgently needed for continued program development and continuity. Other ongoing program expenses include laboratory analyses, contracts for taxonomic identification, equipment and supplies, vehicle leasing and travel to meetings.

DEP faces significant obstacles to adequately staff this program, including obtaining stable multi-year funding. The Department has also had difficulty receiving authorization from the Maine legislature to create and hire new positions, even if they are funded through federal sources. Additionally, long-term funding to cover program operation costs is needed. The DEP wetland biomonitoring program has to date been supported almost entirely through Section 104(b)(3) funding for wetland program development. This includes 104(b)(3) money received through Maine's Performance Partnership Grant, which currently supports the DEP wetland biologist position, and wetland bioassessment pilot project grants administered by EPA Region I.

Section 104(b)(3) funding has enabled DEP to make substantial progress, however the amount available is not nearly sufficient to implement the basic elements necessary for an adequate State wetland monitoring and assessment program. Moreover, competition for 104(b)(3) funds among various programs and agencies is intense, both within Maine and at the regional and national levels. This competition can only be expected to increase as more states attempt to comply with federal requirements to monitor wetlands. As a result, wetland monitoring program managers cannot predict from year to year what resources, if any, may be available. In order to sustain a viable State monitoring program for wetlands, staffing and dedicated financial support comparable to monitoring programs for other waters is fundamental.

EXTENT OF WETLAND RESOURCES

With the implementation of the changes to the Natural Resources Protection Act (NRPA), Maine DEP is now tracking permitted wetland losses and mitigation in the organized townships through an application tracking system. When applications for freshwater wetland alterations are logged in, the amount of fill or area to be altered is also entered by wetland type and geographical location. This system will enable the Department to monitor and report on annual wetland losses. Wetland mitigation and DEP permitted impacts for 2000 and 2001 are summarized in Tables 3-6.1 and 3-6.2 below.

Table 3-6.1. Wetland Mitigation Totals in the Organized Townships.

Source: Maine DEP Wetland Loss Tracking System

Area of Mitigation (Acres) - 2000 (1/1/2000-12/31/2000)					
Wetland Type	Creation	Enhancement	Preservation	Restoration	Total
Forested	0	0	8.77	0.37	9.14
Intertidal (other)	0	0	0	0.02	0.02
Other/Mixed	0	.05	0	0.64	0.69
Wet Meadow	1.70	1.74	15.08	0	18.52
Total	1.70	1.79	23.85	1.03	28.38
Area of Mitigation (Acres) – 2001 (1/1/2001-12/31/2001)					
Wetland Type	Creation	Enhancement	Preservation	Restoration	Total
Forested	0	0	2.13	0	2.13
Other/Mixed	0.34	0.46	24.20	0	25.00
Scrub-shrub	0.15	0	1.89	0	2.04
Total	0.49	0.46	28.23	0	29.18

Table 3-6.2. Permitted Wetland Impacts in the Organized Townships.Source: Maine DEP Wetland Loss Tracking System

Area Impacted (Acres) - 2000 (1/1/2000-12/31/2000)										
Wetland Type	Cranberry permit		Full NRPA permit		Tier I		Tier II		Total	
	Filled	Altered	Filled	Altered	Filled	Altered	Filled	Altered	Filled	Altered
Emergent	0	0	3.30	0	0	0.028	0	0	3.30	0.03
Forested	0	0	10.64	9.92	15.61	0.99	9.73	1.61	13.02	12.52
Great Pond	0	0	0.002	0.018	x	x	x	x	0.002	0.02
Intertidal (mudflat)	0	0	0.18	0.023	x	x	x	x	0.18	0.02
Intertidal (other)	0	0	0.61	0.36	x	x	x	x	0.61	0.36
Intertidal (vegetated)	0	0	0.006	0.08	x	x	x	x	0.006	0.08
Open Water	0	0	0	0	0.24	0	0	0	0.24	0
Other/Mixed	0	0	6.80	2.37	1.89	0	1.55	0.46	10.24	2.83
Peatland	0	0	0	0	0.28	0	0	0	0.28	0
Riverine	0	0	0	0.005	0.06	0	0	0	0.06	0.005
Scrub-shrub	0	0	0.03	0.05	6.59	0.35	2.68	0.40	9.31	0.80
Subtidal (aquatic bed)	0	0	0.14	0.09	x	x	x	x	0.14	0.09
Subtidal (other)	0	0	.02	1.22	x	x	x	x	0.02	1.22
Wet Meadow	0	0	8.72	1.89	2.06	0.56	2.33	0.18	13.11	2.63
Total	0	0	30.45	16.04	26.74	1.93	16.29	2.65	73.47	20.61
Area Impacted (Acres) - 2001 (1/1/2001-12/31/2001)										
Wetland Type	Cranberry permit		Full NRPA permit		Tier I		Tier II		Total	
	Filled	Altered	Filled	Altered	Filled	Altered	Filled	Altered	Filled	Altered
Emergent	0	0	2.38	0	0.51	0	0.50	0	3.39	0
Forested	0	0	11.38	18.51	14.15	0.90	6.85	0.41	32.38	19.82
Great Pond	0	0	0.01	0.02	x	x	x	x	0.01	0.02
Intertidal (other)	0	0	0.09	0.14	x	x	x	x	0.09	0.14
Intertidal (vegetated)	0	0	0.57	0.15	x	x	x	x	0.57	0.15
Open water	0	0	0	0.01	0	0	0	0	0.00	0.01
Other/Mixed	0	0	5.38	0	2.83	0.30	3.29	0.53	11.51	0.83
Riverine	0	0	0.73	0.29	0	0	0	0	0.73	0.29
Scrub-shrub	0	0	11.71	0.91	4.31	0.53	3.30	0	19.32	1.44
Subtidal (aquatic bed)	0	0	0.05	1.77	x	x	x	x	0.05	1.77
Wet Meadow	0	0	1.61	0.11	2.73	0.42	0.60	0	4.94	0.54
Total	0	0	34.18	21.90	24.52	2.16	14.55	0.94	73.25	25.0

X = Tier review not available for projects located in these resources

ADDITIONAL WETLAND PROTECTION ACTIVITIES

The following additional activities were funded wholly or in part by the U.S. Environmental Protection Agency through Clean Water Act Section 104(b)(3) Wetland Program Development Grants:

Wetland Conservation Plan

The State Planning Office (SPO) has completed a State Wetland Conservation Plan which addresses regulatory, program and policy issues, and makes recommendations for future goals related to wetlands. In 1994, SPO convened the Wetlands Conservation Plan Task Force to guide development and implementation of the Plan. The Task Force included State and Federal agency staff, business members and conservation groups. The first priority of the Task Force was to respond to a 1993 Legislative Resolve which required DEP and SPO to explore the feasibility of assuming jurisdiction over federal wetlands regulation, and to report on other options for streamlining the wetland permitting process. In response to the Resolve, the Task Force formed a wetlands regulatory workgroup. The efforts of the regulatory workgroup resulted in the changes to the State's wetland regulatory program summarized above. The Task Force subsequently formed three additional workgroups to develop goals for wetland inventory, wetland assessment, and wetland mitigation. The Wetland Conservation Plan is currently available from SPO.

Wetland Characterization Pilot Project

Wetlands planning and watershed management in Maine have taken significant steps forward since the initiation of work on the State Wetland Conservation Plan and the creation of the Division of Watershed Management at Maine DEP in 1994. The Wetland Conservation Plan effort led to a recognition that watershed level planning for wetlands was needed, which in turn led to the Casco Bay Watershed Pilot Project (CBWPP).

Work on the CBWPP which began in 1997 was completed in late spring 2000. It provides landscape-level assessment of wetland functions using a GIS system based on National Wetland Inventory (NWI) maps. The geographic information system also includes soils, hydrography, population, FEMA flood zone mapping, roads, and cultural feature layers. A series of queries specific to six chosen wetland functions were applied to the GIS which identified those wetlands likely to perform the chosen wetland functions at a significant level. Field work to determine the sensitivity of the method was undertaken during the 1998 and 1999 field seasons. The field work indicated a high level of accuracy between the GIS characterization and the functions found on site. The methodology developed during the Casco Bay Wetland Characterization Project will also be extended to the Piscataqua, Salmon Falls and Saco watersheds.

The State Planning Office is working with federal and state agencies, localities, and land trusts to develop uses of the characterization. The characterization work also will be incorporated into broader habitat planning strategies being developed by the state. SPO has distributed packages of relevant open space planning, GIS, and hard copy maps to 14 pilot towns. Staff will be using

the characterization as a base layer of data in supporting detailed local assessment of wetland priorities for conservation action.

Wetland Compensation Report

Early in 2002, DEP submitted a report to the Maine Legislature on the analysis of existing wetland compensation results, and recommendations for changes to policy concerning compensation and compensation funds/banks. The report assesses impacts to wetlands under the State's wetland permit program, and identifies that localized cumulative impacts in some southern Maine towns may justify local action to protect wetlands. State staff recommended to the Legislature that the state provide tools to localities seeking to protect wetlands, including a model ordinance for wetlands protection, a method for local prioritization of wetland conservation activities, and guidance on the establishment of local wetland compensation funds to ensure some return to local wetlands protection in exchange for wetland loss. The report further recommends that the state not establish a state-level compensation fund at this time, due to a lack of adequate state-wide wetland alterations within the relevant range for use of such a fund. However, state staff are recommending that the existing statutory possibility for such a fund not be allowed to sunset, as regional or local compensation funds may prove to be beneficial over time, and should have the same ability to be considered in the future as mitigation banks.

Wetland Restoration

The State Planning Office is working with Corporate Partners and the New England Regional Inter-Agency Team to identify and seek resources for the restoration of priority wetlands. Staff worked with the CRWP technical community to review potential projects and make recommendations to the Executive Board. Eleven projects were funded and restoration work is ongoing or will begin in the summer of 2002.

Ecological Assessment of the Boundary Plateau and St. John Uplands Ecoregions

This project involves natural resource assessment work in the Boundary Plateau and St. John Uplands (over 4.5 million acres). Utilizing information from landowners and recent landscape analysis conducted by the Maine Natural Areas Program, inventory priorities will be developed to conduct a coarse filter survey of the ecoregions. The assessment focuses on locating exemplary natural communities and ecosystems, and habitats supporting rare, threatened and endangered plants and animals. Data gathered will support forest management plans.

Defining and Assessing the Vernal Pool Resource in Southern Maine

Maine hosts several common, rare and endangered wildlife species that require vernal pools to complete their life history, but because of their small size (often less than 0.1 acre), current federal and state regulations do not adequately protect these valuable wetland habitats. In response, the Maine Department of Inland Fisheries and Wildlife is cooperating with the State Planning Office to develop and evaluate strategies for conserving Maine's vernal pool resources. The project includes the following major goals:

To provide MDIFW and SPO with the field data needed to determine the magnitude of the “Significant Vernal Pool” resource in southern Maine.

To evaluate the effectiveness and feasibility of moving forward with the protection of such pools under MDIFW’s Landscape Habitat Analysis Project (a proactive initiative to help Maine towns identify and incorporate important wildlife habitats into their comprehensive planning process), and/or as candidates for Significant Wildlife Habitat under the Natural Resources Protection Act.

To assess the cost and feasibility of conducting a comprehensive survey and delineation of southern Maine’s vernal pool resource.

Vernal Pools Education and Outreach

To move forward in support of the Wetlands Conservation Plan goal of furthering protection of vernal pools throughout the state, SPO will develop an integrated program of outreach, education and field services. The Vernal Pools Focus Group has identified this as a need of paramount importance to ensure the success of the State’s vernal pool regulatory program by raising the general level of understanding and appreciation for these important resources.

SPO will direct efforts to develop and deliver educational materials for identified groups within the state, including developers, realtors, foresters, municipal code enforcement officers and conservation commissions. In addition, educational forums will be held throughout the state, with particular emphasis on those areas of high growth and development where vernal pools are currently at the greatest risk. SPO will also work to initiate a voluntary data gathering effort aimed at developing a landowner-directed Significant Vernal Pools certification program.

Conserving Habitat in a Developing Landscape

The goal of this project is to conserve wildlife habitat and plant communities in southern Maine in the face of habitat loss from fragmentation and development. This is important to protect the full spectrum of Maine’s native plant and animal species, and to help keep species of concern from becoming threatened or endangered. The project involves preparation of coarse site conservation plans for focus areas of approximately 15 land trusts in southern Maine. It will present local land trusts with information on the impacts of development on wildlife, and will provide GIS maps for at least one priority project of each land trust. This project will also provide legal, technical, and fundraising support and guidance to each land trust for securing lands of conservation interest.

Natural Community Classification Revisions

The Maine Natural Areas Program has revised the State's natural community classification to reflect information collected in the field over the past decade. As the revisions were made, demand for a more user-friendly product was voiced by the forestry and consulting communities. In response, MNAP drafted natural community fact sheets, which are cross-referenced to all available classification systems. The resulting product is designed as a user friendly field guide for a diverse array of land managers, ecologists, foresters and consultants. The product also provides updated information on S1 (critically imperiled) and S2 (imperiled) communities that fall into the regulatory realm in Maine.

Plant Conservation Volunteer Program

The New England Plant Conservation Program (NEPCOP) initiated the Plant Conservation Volunteer Program (PCV) in response to unfilled plant conservation needs of the New England region. The PCV program is expanding into Maine, and will create the opportunity to accomplish on the ground plant conservation work that would otherwise be ignored. The goals of the PCV program are to 1) monitor rare plant habitats; 2) work with landowners to manage rare plant habitats; and 3) develop a constituency for native plants. Of the 250 rarest plant species tracked by the Maine Natural Areas Program, 107 are associated with wetlands.

The project objectives include: 1) assist the New England Wildflower Society in training Plant Conservation Volunteers to conduct monitoring of rare plant populations using natural heritage methodology; 2) prioritize the selection of 100 sites to be monitored, and provide information and assistance to private landowners; and 3) incorporate data from the work of Plant Conservation Volunteers into the state Biological and Conservation Data System for further use by private and public agencies in conservation and development planning.

Invasive Plant Education

A partnership of federal, state and private organizations has been created to facilitate a statewide educational outreach effort to increase awareness of the adverse effects of invasive plants species. Project objectives include: 1) To educate the public and private land managers about the threat of invasive plant species; 2) To educate garden suppliers and members of the nursery industry about the threat of invasive plant species, and to encourage them to sell native plant species; 3) To educate the general public about the threat of invasive plant species, and to encourage them to be more selective in choosing garden and landscape plantings; 4) To create educational materials or programs on invasive plant species suitable for use in schools and other educational settings.

Staff Support

Section 104(b)(3) Wetland Program Development Grant funding was used for staff support by the Maine State Planning Office and the Maine DEP Wetland Biomonitoring Program.